

J. SHAW.
VALVE.

APPLICATION FILED MAY 11, 1910.

1,019,374.

Patented Mar. 5, 1912.

2 SHEETS—SHEET 1.

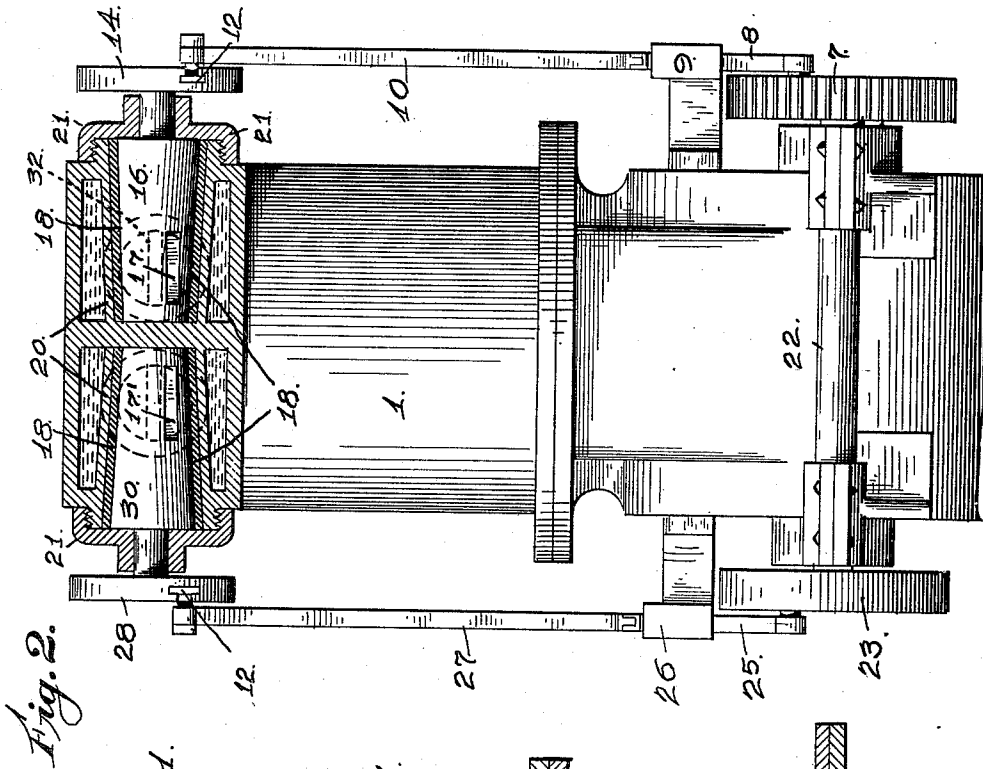


Fig. 2.

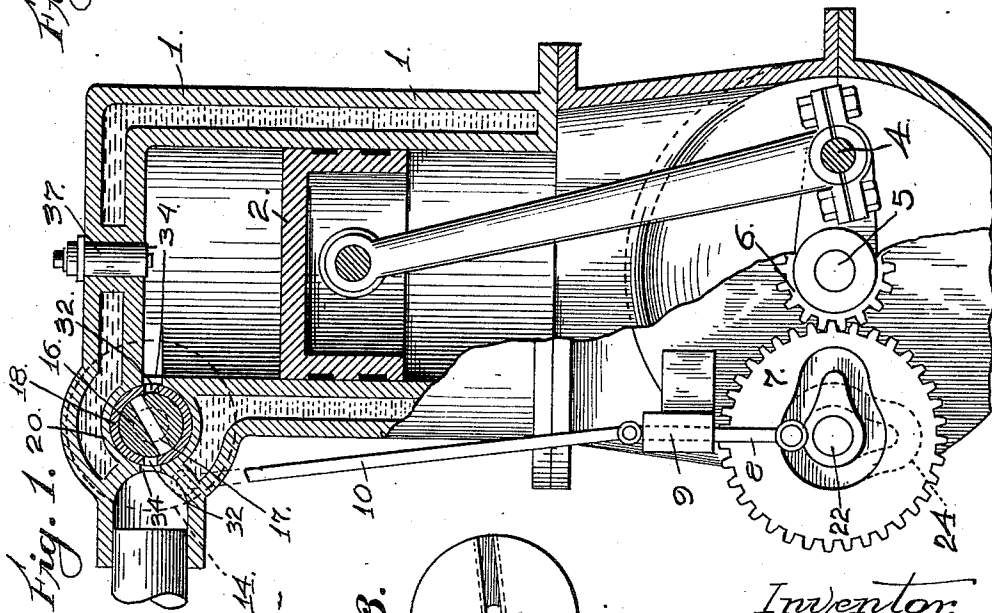


Fig. 3.

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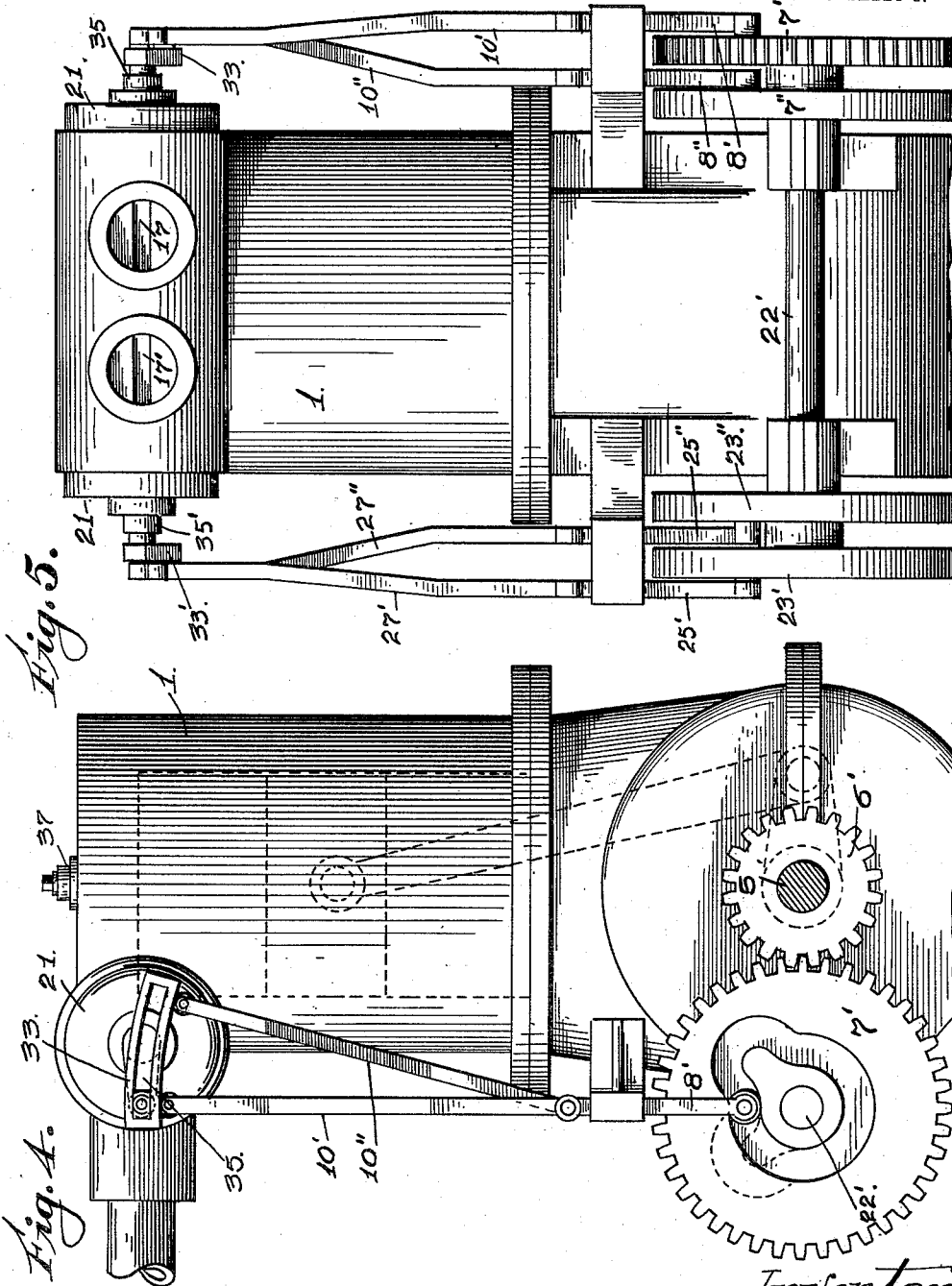
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UNITED STATES PATENT OFFICE.

JAMES SHAW, OF SAN FRANCISCO, CALIFORNIA.

VALVE.

1,019,374.

Specification of Letters Patent.

Patented Mar. 5, 1912.

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To all whom it may concern:

Be it known that I, JAMES SHAW, citizen of the United States, residing at San Francisco, California, have invented certain new and useful Improvements in Valves and Valve-Gears, of which the following is a specification.

My invention relates to valves for the admission and exhaust of gas, to and from the cylinders of gas or vapor engines, and has for its object, simplicity of construction, a quick as well as a positive movement, accuracy of adjustment and time, adapted to prevent back-firing by interposing a substantial barrier between the cylinders and the source of supply and to reverse the rotary movement of the engine.

I accomplish these several features by means of the construction and arrangement disclosed in the accompanying drawings, in which,

Figure 1 is a partial vertical section of a four cycle gas engine, showing my valve in position. Fig. 2 is a front elevation of the engine with the valve casing in section. Fig. 3 is a detail in front elevation of the valve disk. Fig. 4 is a side elevation of an engine showing a modification of the disk by using a reversing link motion in connection with two cams. Fig. 5 is a front elevation of Fig. 4.

The numeral 1 is used to designate a cylinder of a gas engine of the usual type, having a piston 2 connected in the usual manner by a pitman 3 to a crank 4 on the crank shaft 5. Rigidly secured to the crank shaft 5 is a geared pinion 6 meshing with gears on a throat cam 7. Engaging the groove in the cam 7 is a vertically moving follower 8, slidably mounted in the holder 9. This follower 8 is rectangular in cross section as is also the guide or holder 9, so the side of the follower bearing the roller that engages the groove in the cam 7 will always remain on the side nearest the cam. A connecting link 10 is pivotally connected at its lower end to the upper end of the follower 8 and its upper end has a flanged pivoted head which engages the T-groove 12, of the valve disk 14. The disk 14 is mounted on the spindle of the valve 16, which valve contains an opening 17, said valve being the frustum of a cone, and is journaled in a sleeve 18 within the valve casing 20, the sleeve and valve being held in position by a threaded cap 21 which also serves as a bearing for

the spindle of the valve 16 and a take up for the wear of the sleeve 18. A shaft 22 to which the cam 7 is secured, carries at its opposite end a throat cam 23, the relative position of its groove 24 being shown in dotted lines in Fig. 1. This cam 23 has a follower 25 operating a discharge or exhaust valve 30, said valve and its connections being similar to the supply valves 16 and its connections with the exception that the cam 23 need not be a gear, as, in order to keep both valves 16 and 30 working in their proper relations each to the other, the cam 23 is rigidly secured to the cam 7 by means of the shaft 22 which acts as a means of communication between them. The valves 16 and 30 are mounted in sleeves 18 for two reasons. First, it provides a wearing surface that is easily replaced and second, renders it more convenient to provide apertures or openings 32 that will register or coincide with the openings 17 in the valves, and further provides for a given area for the opening between the sleeves 16 and the apertures 34 of the valve casing 20. The groove 12 of the disk 14 is obtuse angled rather than continuous or diametrical, in order to provide for the lap and lead for the charge. This lap and lead is reversed by sliding the T-head of the connection 10 or 27, to the opposite side of the center of the disk, providing thus, for a reverse movement on the engine.

The operation is as follows; the piston 2 starts upward and just previous to reaching its highest point, causes the throat cam 7 through the gears 6 and 7, to operate the proper connection 8, 10 and 14 and brings the valve 16 to a position where its passage 17 opens communication between the supply and the cylinder. The piston 2 now draws in a charge of gas, and as the piston continues the valve 16 is revolved back to a closed position, thus presenting a substantial barrier also a positive one between the cylinder and the supply. Continuing, the upward stroke of the piston compresses the charge, the same being ignited at the proper moment by the spark plug 37, drives the piston downward on its second revolution. The impulse obtained being imparted to the revolving mechanism, causes the piston to travel upward compressing the consumed gas and causing the valve 30 by means of the connections 22, 23, 25, 27 and 28, to open communication between the cylinder

and exhaust through its opening 17' when the consumed gas is discharged thereby. The piston now traveling back again is ready for its succeeding charge and so on *ad infinitum*.

It is obvious from the foregoing, that the hereinbefore described valve with its operating mechanism provides a positive action that can be easily adjusted as to time and volume of gas admitted, providing at the same time, an exhaust of larger area than the intake which advantage serves somewhat as a muffler in addition to getting rid of the consumed gases in as short a space of time as possible. In this arrangement it is also possible to completely remove all communication between the cylinder and supply, as when the opening 17 is turned away from the apertures 32 of the sleeves 16, a double wall of solid metal is interposed, which no pressure capable of being produced in the cylinder is able to remove.

By reason of the conic shape of the valves, any wear can be instantly taken up by the threaded caps 21. The angle of the groove 12 in the valve disk 14, provides for a reverse of motion.

I do not wish to limit myself to the precise construction shown herein, but rather to avail myself of any modifications that may fall properly within the scope of my invention, the details of construction being so susceptible to variations as for instance, a reverse link-motion with two sets of cams may be used in place of the disk 14. This arrangement is illustrated in Figs. 4 and 5, wherein two cams 7' and 7'', have a difference in their operating grooves corresponding to the lap and lead of the groove 12 in the disk 14. The reciprocating members 8' and 8'' operating double connections 10' and 10'' which terminate in an arc or link 33,

in turn operating a crank arm 35 secured to the valve 16. By moving the link 33 to its opposite extreme, the rod or connection 10'' only affects or operates the crank arm 35, and by thus reversing the lap and lead the reverse movement of the engine is acquired. The cams 23' and 23'', together with connections 25' and 25'' 27' and 27'' are provided for the forward and reverse motion of the exhaust valve 30, which has its crank arm 35', and operating link 33'. The operating cam 7', 7'', 23' and 23'', are separable on the shaft 22' so that each may be gaged or set independently of the other, the shaft 22' being driven as in the previous instance by means of a pinion 6' secured to the drive shaft 5 and meshing with the gear on cam 7'.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is,

A valve for internal combustion engines comprising a cylinder, the casing of the cylinder having passages therein, a removable, non-rotating conical sleeve mounted within the casing, said sleeve having diametrically disposed openings therein connecting with said passages said openings being smaller than the passages, means for supplying oil to said sleeve, a solid conical valve fitting snugly in the sleeve and having an opening passing diametrically therethrough and means for rocking the valve from the crank shaft to bring the opening into alinement with the openings in the sleeve.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES SHAW.

Witnesses:

W. J. RHOADS,
MABEL MOHRMAN.